23 January 2013

CRUISE RESULTS
NOAA Fisheries Research Vessel *Gordon Gunter*
Cruise No. GU 13-05
Ecosystem Monitoring Cruise

CRUISE PERIOD AND AREA

The cruise period was 07 November to 26 November 2013. The NOAA fisheries research vessel *Gordon Gunter* stopped to lower instruments over the side at 81 stations. Samples were collected in the Mid-Atlantic Bight, Southern New England, Georges Bank, and the Gulf of Maine regions.

OBJECTIVES

The principal objective of the survey was to assess the pelagic components of the Northeast U.S. Continental Shelf Ecosystem from water currents to plankton, pelagic fishes, marine mammals, sea turtles, and seabirds. Specifically we wanted to quantify the spatial distribution of the following parameters: water currents, water properties, phytoplankton, microzooplankton, mesozooplankton, pelagic fish and invertebrates, sea turtles, marine mammals, and sea birds. We planned to use traditional and novel techniques and instruments used by the Ecosystem Monitoring survey and the NEFSC Herring Acoustic survey to make a broad array of measurements of the pelagic ecosystem.

Operational objectives were: (1) collect underway data using TSG, SCS, and ADCP; (2) complete CTD and bongo operations at stations throughout area, (3) calibrate the EK60 Scientific Sounder, (4) conduct acoustic surveys using the EK60, (5) collect biological data to verify species-specific acoustic measurements using midwater trawls, (6) collect marine mammal and seabird observations.

METHODS

Plankton and hydrographic sampling was conducted by making double oblique tows using the 61-cm bongo sampler and a Seabird CTD. Bongo net sampling was conducted at a ship speed of 1.5 – 2.0 knots. A mechanical flowmeter was suspended within the mouth of each 61-cm sampler to determine the amount of water filtered by each net. The plankton sampling gear was deployed off the port stern quarter of the vessel using an A-frame. Two types of tow protocols were conducted with the 61-cm bongo: a Standard bongo protocol and a Gear Comparison protocol. For a Standard bongo protocol, the 61-cm bongo was equipped with two 335-micron mesh nets, and one net each was preserved for zooplankton and ichthyoplankton analyses. For the Gear Comparison protocol, the bongo was fitted with a 335- and a 505-micron mesh net, and both were preserved for ichthyoplankton analysis. The 61-cm bongo plankton samples were preserved in a 5% solution of formalin in seawater. During most Standard tows, a 20-cm bongo was attached above the 61-cm bongo. Two types of 20-cm bongo collections were made: NEFSC tows for DNA barcoding of fish eggs and Woods Hole Oceanographic Institution / University of Connecticut tows for DNA analysis of zooplankton. The NEFSC tows used 335-micron mesh nets and the WHOI / UConn tows used 165-micron mesh nets. WHOI / UConn samples were collected at five stations in each of four of the regions sampled: Mid-Atlantic Bight, Southern New England, Georges Bank, and Gulf of Maine. NEFSC samples were collected at all other stations, weather permitting. All 20-cm bongo samples were preserved using 95% ethanol. All ethanol samples were changed once at 24 hours after the initial preservation.

Fixed hydrographic stations were sampled with the CTD 911/Niskin bottle rosette sampler deployed off the port stern quarter of the vessel using an A-frame. The rosette was equipped with eleven 10-liter Niskin bottles, a Laser In-Situ Scattering Transmissometer (LISST), and a Flouroprobe. Water was collected from the near-surface, mid- and near-bottom depths during the vertical casts to collect samples for dissolved inorganic carbon (DIC) / total alkalinity (TAlk), nutrients, Chlorophyll-a, and stable isotopes. DIC / TAlk samples were preserved using mercuric chloride for later analysis. Water samples for nutrient analysis were filtered and frozen for future analysis. Water samples were also filtered for stable isotope analysis and the filtered water and filters were frozen for future analysis. Chlorophyll-a analysis was conducted on board using a bench top fluorometer.

Continuous monitoring of the seawater salinity, temperature and chlorophyll-a level, from a depth of 3.7 meters along the entire cruise track was done by means of a thermosalinograph, and a flow-through fluorometer hooked up to the ship's flow-through seawater system. Data from those instruments and the thermosalinograph, and the fluorometer at 10-second intervals was logged into the Scientific Computer System (SCS). The data records were given a time-date stamp by the GPS unit. Calibration of the flow-through systems CTD salinities and chlorophyll-a of surface waters were undertaken while the ship was underway. Sample analysis for these calibrations followed the protocol outlined in the Ecosystem Monitoring Program Operations Manual.

Marine mammal and seabird observations were conducted during daylight hours. Observers conducted visual operations from the flying bridge when the vessel was underway between sampling stations, and making at least 5 knots of speed.

RESULTS

The *Gordon Gunter* was scheduled to sail from Norfolk, Virginia on 07 November 2013. The ship had hydraulic problems that delayed the start of the cruise 5 days while we waited for repairs to be made. Unfortunately, after the repairs did not fix the problem we had to cancel the mid-water trawl operations for the cruise. The objectives of the cruise shifted from an Integrated Pelagic Survey to an Ecosystem Monitoring survey.

The *Gordon Gunter* sailed 14 November 2013, after delaying sailing for one day to allow for a low-pressure system to pass over the region. In total, 81 stations were completed during the cruise, 58 stations were Standard bongo (Ecosystem Monitoring) stations, 18 were fixed hydrographic stations, and five were fixed hydrographic and Standard bongo stations. In addition, seven Gear Comparison tows were conducted at Standard bongo stations. A summary of survey activities is presented in Table 1. Areal coverage for the cruise is shown in Figure 1.

The delay in starting the cruise and poor weather conditions resulted in the loss of station spatial coverage for the survey. Every effort was made to reduce the impact of the mechanical delay and poor weather conditions by the ships personnel. They were very flexible with the daily schedule to keep operations going in the most efficient and safe way possible.

DISPOSITION OF SAMPLES AND DATA

The plankton operations logs and plankton samples from the Standard and Gear Comparison protocol samples collected with the 61-cm bongo were delivered to the Oceanography Branch of the NEFSC, Narragansett, Rhode Island for quality control processing.

The plankton samples collected with the 20-cm bongo were delivered to the various investigators. The NEFSC samples were delivered to the Oceanography Branch of the NEFSC, Narragansett, Rhode Island. The WHOI / UConn samples were delivered to the Woods Hole Laboratory, Woods Hole, Massachusetts.

The Oceanography Branch of the NEFSC, Woods Hole, retained the CTD data and original log sheets.

LISST and Flouroprobe data were delivered to the Oceanography Branch of the NEFSC, Narragansett, Rhode Island.

Nutrient samples were shipped to the University of Maine.

DIC / TAlk samples were shipped to the University of New Hampshire and NOAA, AMOL laboratory in Miami, Florida.

Stable Isotope samples were delivered to the EPA Laboratory, Narragansett, Rhode Island.

SCIENTIFIC PERSONNEL

Plankton / CTD Ops
Midnight to Noon (0000 - 1200)

Harvey Walsh- Chief Scientist	NMFS, Oceaonography Branch, Narrgansett, RI
Cristina Bascuñán	NMFS, Oceaonography Branch, Woods Hole, MA

Noon to Midnight (1200 - 0000)

Tamara Holzwarth-Davis- Watch Chief	NMFS, Oceaonography Branch, Woods Hole, MA
Chris Taylor	NMFS, Oceaonography Branch, Narrgansett, RI

Day watch (0600 - 1800)

Desiree Tommasi	SUNY Stony Brook / GFDL, Princeton, NJ

Acoustics / Mid-Water trawling (***Canceled***)

Mike Jech	NMFS, Ecosystems Surveys Branch, Woods Hole, MA

Seabird / Marine Mammal Observations

Tom Johnson	Contracted by CUNY, Staten Island, NY
Nicholas Metheny	Contracted by CUNY, Staten Island, NY

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Table 1. Summary of sample activities conducted at 81 stations at which the *Gordon Gunter* stopped to lower instruments over the side during Cruise No. GU 13-05. Latitude and Longitude are shown in decimal degrees. Std BON/CTD = Standard Plankton Protocol, GC BON = Gear Comparison Plankton Protocol, CTD PROFILE 911+ = Fixed hydrographic station, 2B3 = 333 mesh, 2B1 = 165 mesh.

Cast Number	SiteID	Date	Latitude	Longitude	Operation	20-cm Bongo
1	1	14-Nov	37.4050	-75.4317	Std BON/CTD, GC BON	2B3
3	2	14-Nov	37.4967	-75.3333	Std BON/CTD, GC BON	2B1
1	3	14-Nov	38.0017	-74.9583	CTD PROFILE 911+	
5	4	14-Nov	38.3333	-74.7533	Std BON/CTD, GC BON	2B3
7	5	14-Nov	38.4217	-74.8383	Std BON/CTD	2B3
8	6	14-Nov	38.7283	-74.7567	Std BON/CTD	2B1
9	7	14-Nov	38.8317	-74.2533	Std BON/CTD, GC BON	2B3
11	8	14-Nov	38.8350	-74.0850	Std BON/CTD	2B1
12	9	14-Nov	39.4983	-74.2333	Std BON/CTD	2B3
2	10	14-Nov	39.7100	-74.0050	CTD PROFILE 911+	
13	11	15-Nov	39.6667	-73.5833	Std BON/CTD	2B1
14	12	15-Nov	39.4900	-73.5867	Std BON/CTD, GC BON	2B3
3	13	15-Nov	39.3600	-73.3900	CTD PROFILE 911+	
16	14	15-Nov	39.2483	-73.3383	Std BON/CTD	2B1
17	15	15-Nov	39.2467	-73.0033	Std BON/CTD	2B3
4	16	15-Nov	39.0550	-72.7467	CTD PROFILE 911+	
5	17	15-Nov	39.0133	-72.5900	CTD PROFILE 911+	
18	18	15-Nov	39.4967	-72.7533	Std BON/CTD	2B3
19	19	15-Nov	39.6633	-73.3333	Std BON/CTD	2B3
20	20	15-Nov	40.0817	-72.8367	Std BON/CTD	2B1
21	21	16-Nov	40.1617	-71.7517	Std BON/CTD	2B3
22	22	16-Nov	40.2467	-71.4200	Std BON/CTD	2B3
23	23	16-Nov	40.2483	-71.0017	Std BON/CTD	2B1
6	24	16-Nov	39.8317	-70.6233	CTD PROFILE 911+	
7	25	16-Nov	40.0400	-70.6067	CTD PROFILE 911+	
24	26	16-Nov	39.9950	-70.0850	Std BON/CTD	2B1
26	27	16-Nov	40.2483	-70.2483	Std BON/CTD	2B3
27	28	16-Nov	40.5933	-70.4100	Std BON/CTD	2B3
8	29	16-Nov	40.6717	-70.6250	CTD PROFILE 911+	
28	30	17-Nov	40.7567	-70.3383	Std BON/CTD	2B1
29	31	17-Nov	40.6583	-69.9200	Std BON/CTD	2B3
30	32	17-Nov	40.0833	-69.5883	Std BON/CTD	2B3
31	33	17-Nov	40.1617	-69.2500	Std BON/CTD	2B1
32	34	17-Nov	40.3883	-69.3233	Std BON/CTD	2B3
33	35	17-Nov	40.7500	-69.2483	Std BON/CTD	2B3
9	36	17-Nov	40.9033	-69.1567	CTD PROFILE 911+	
34	37	17-Nov	40.4150	-68.6750	Std BON/CTD	2B3
35	38	17-Nov	40.3283	-68.2550	Std BON/CTD	2B1

Table 1. Continued.

Cast Number	SiteID	Date	Latitude	Longitude	Operation	20-cm Bongo
10	39	18-Nov	40.2400	-67.6800	CTD PROFILE 911+	
11	40	18-Nov	40.3883	-67.6900	CTD PROFILE 911+	
36	41	18-Nov	40.4983	-67.3367	Std BON/CTD	2B3
37	42	18-Nov	40.6667	-67.7533	Std BON/CTD	2B3
38	43	18-Nov	40.9967	-67.7583	Std BON/CTD	2B3
12	44	18-Nov	40.9250	-67.7100	CTD PROFILE 911+	
39	45	18-Nov	40.7467	-67.5033	Std BON/CTD	2B3
40	46	18-Nov	40.9133	-67.0867	Std BON/CTD	2B3
42	47	18-Nov	41.0067	-66.8417	Std BON/CTD	2B1
43	48	18-Nov	41.0817	-66.8383	Std BON/CTD	
44	49	19-Nov	41.0833	-67.2533	Std BON/CTD	
45	50	19-Nov	41.1700	-67.5867	Std BON/CTD	
46	51	19-Nov	41.2467	-67.6633	Std BON/CTD	
48	53	20-Nov	41.4167	-68.8167	Std BON/CTD	
49	54	20-Nov	41.8350	-69.8100	Std BON/CTD	
50	55	20-Nov	41.9967	-69.6683	Std BON/CTD	
52	56	21-Nov	42.0900	-70.0700	Std BON/CTD	2B3
13	57	21-Nov	42.3150	-70.2783	CTD PROFILE 911+	
53	58	21-Nov	42.3300	-70.4183	Std BON/CTD	2B1
14	59	21-Nov	42.3750	-70.4600	CTD PROFILE 911+	
54	60	21-Nov	42.4183	-70.6217	Std BON/CTD	2B3
55	61	21-Nov	42.4167	-69.9183	Std BON/CTD	2B3
56	62	21-Nov	42.5017	-69.6633	Std BON/CTD	2B1
57	63	21-Nov	42.7517	-69.4983	Std BON/CTD	2B3
58	64	21-Nov	42.3267	-68.6617	Std BON/CTD	2B3
59	65	22-Nov	42.2483	-67.7467	Std BON/CTD	2B3
61	66	22-Nov	42.1633	-67.6833	Std BON/CTD	2B1
17	67	22-Nov	42.0117	-67.6917	CTD PROFILE 911+	
62	68	22-Nov	42.0817	-67.0017	Std BON/CTD	2B3
63	69	22-Nov	41.9183	-66.2550	Std BON/CTD, GC BON	2B1
65	70	22-Nov	41.9133	-66.0883	Std BON/CTD, GC BON	2B1
67	71	22-Nov	42.2267	-65.7650	Std BON/CTD	2B3
68	72	22-Nov	42.4967	-66.5033	Std BON/CTD	2B1
70	73	23-Nov	42.4183	-67.0033	Std BON/CTD	2B3
71	74	23-Nov	42.5750	-67.2417	Std BON/CTD	2B3
20	75	23-Nov	43.0250	-67.7000	CTD PROFILE 911+	
73	76	23-Nov	43.1633	-67.6733	Std BON/CTD	2B1
74	77	23-Nov	43.3983	-67.7033	Std BON/CTD	2B3
22	78	23-Nov	43.7733	-68.6700	CTD PROFILE 911+	
75	79	24-Nov	43.3367	-69.3317	Std BON/CTD	2B3
76	80	24-Nov	43.2450	-69.4983	Std BON/CTD	2B1
77	81	24-Nov	42.9983	-70.1683	Std BON/CTD	
23	82	24-Nov	43.0000	-70.4167	CTD PROFILE 911+	

Figure 1. Map of stations occupied during Cruise No. GU 13-05.